

BENCHMARKS

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NEW POLICIES, PROCEDURES, AND OTHER IMPORTANT STUFF

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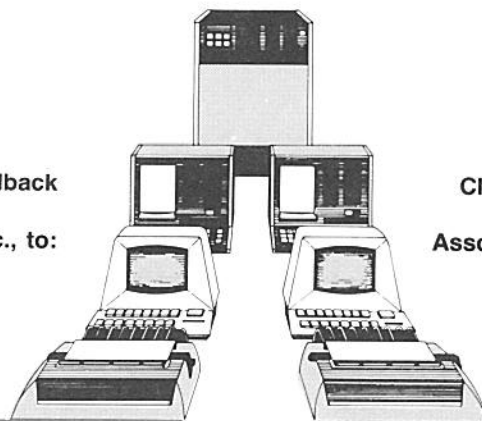
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BENCHMARKS Reader/User feedback is encouraged.

Send all letters, suggestions, etc., to:
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SERVICES AVAILABLE TO USERS OF THE NTSU COMPUTING FACILITIES

The NTSU Computing Center is located in the Information Sciences Bldg., Room 119. Telephone: (817) 565-2324. HELP DESK phone: 565-4050. Graphics Lab phone: 565-3479

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STUDENT PROGRAMMING PROBLEMS - CSCI Dept., GAB Room 542A; BCIS Dept., BA Room 152

JCL PROBLEMS; PASSWORD & OPERATING SYSTEM PROBLEMS; COMMUNICATION/TERMINAL PROBLEMS - Help Desk

DATA ENTRY & KEYPUNCH; TEST SCORING & ANALYSIS - Betty Grise

ADMINISTRATIVE APPLICATIONS - Coy Hoggard

PRINTOUT RETRIEVAL - RJE Operators

DIALING UP NTSU COMPUTERS OVER THE TELEPHONE

Phone numbers for the Local Area Network (LAN) are:

300 BAUD: (817) 565 - 3300
1200 BAUD: 565 - 3499
300 BAUD: D/FW METRO 429 - 6006

After a communications link has been successfully established, the user will receive the # prompt. At this point, it will be necessary to issue the appropriate CALL command to connect with a computer.

The numbers that will accept either 300 or 1200 baud communications (connected to modems with an autobaud feature) are currently out of order. Watch MUSIC/SP News and *Benchmarks* for information concerning their availability.

CALL 8040 will connect with the NAS/80 (for MUSIC/SP 8050 access) 8060

CALL 3270 will connect with the NAS/8043 through the 3270 3280 protocol converter

CALL DEC will connect with the VAX Cluster
CALL 780 will connect with the Research VAX

CALL 2000 will connect with the HP-2000

NTSU CABLE SYSTEM SCHEDULE

The current configuration of the NTSU cable system is as follows:

Channel 8 — Tager microwave channel. Carries broadcasts to and from NTSU to other links in the Tager network.

Channel 10 — NTSU Computer System Status Monitor (SSM). Displays the current status of the NAS, VAX and HP computer systems supported by the Computing Center.

Channel 7 — NT Daily. Broadcast originates from the NTSU Journalism Department.

Channel 12 — Sammons Cable. Currently broadcasts Cable News Network (CNN), unless a special program is requested.

Special broadcasts to and from classrooms (on channel 11), etcetera can be arranged by contacting the Media Library (565-2484).

HOURS FOR NTSU COMPUTER ACCESS AREAS*

SUMMER 1986*:

<u>Days</u>	<u>Times</u>	<u>Location</u>
Sunday	2-10 p.m. Noon-Midnight 1-8 p.m.	ISB 110 Terminal Area Computing Center RJE GAB 550C
Saturday, Sunday	Noon-11:45 p.m. Noon-5 p.m.	College of Business Graphics Lab
Monday	7:00 a.m.-Midnight	Computing Center RJE
Tuesday-Saturday	7:00 a.m.-Open 24 hrs/day	Computing Center RJE
Monday-Thursday	7:30 a.m.-10 p.m. 8:15 a.m.-11:45 p.m. 8 a.m.-5 p.m.	ISB 110 Terminal Area College of Business GAB 550C
Monday-Friday	8 a.m.-10 p.m.	Graphics Lab
Friday	7:30 a.m.-6 p.m. 8:15 a.m.-7:45 p.m. 8 a.m.-5 p.m.	ISB 110 Terminal Area College of Business GAB 550C
Saturday	9 a.m.-6 p.m. CLOSE Midnight 11 a.m.-6 p.m.	ISB 110 Terminal Area Computing Center RJE GAB 550C

*Hours on finals days and between sessions may vary. Check MUSIC/VAX News and/or posted schedules for exceptions.

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*   NEW POLICIES,   *
*   PROCEDURES,    *
*   AND OTHER      *
*   IMPORTANT      *
*   STUFF          *
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MVS Upgrade Brings About Some Changes

On Wednesday, the 21st of May, MVS was upgraded to version 1.3.4. The following changes are by-products of this upgrade:

- * If you are executing the VS COBOL compiler without a PROC, you should insert a `//STEPLIB DD SYS1.VSCOLIB,DISP=SHR` line in your JCL.
- * If you are executing a VS COBOL compiler-produced load module without a PROC, you should insert a `//STEPLIB DD SYS1.VSCLLIB,DISP=SHR` line in your JCL.
- * If you are executing the PL/I Optimizing compiler without a PROC, you should insert a `//STEPLIB DD SYS1.PLICOMP,DISP=SHR` line in your JCL.
- * If you are executing a PL/I Optimizing compiler-produced load module without a PROC, you should insert a `//STEPLIB DD SYS1.PLILINK,DISP=SHR` line in your JCL.
- * If you are executing the VS FORTRAN compiler without a PROC, you should insert a `//STEPLIB DD SYS1.FORTVS,DISP=SHR` line in your JCL.
- * If you are executing a VS FORTRAN compiler-produced load module without a PROC, you should insert a `//STEPLIB DD SYS1.VFORTLIB,DISP=SHR` line in your JCL.
- * The PROC names for VS FORTRAN have changed:

Old PROC Name:	New PROC Name:
FORTVC	FORVC
FORTVCG	FORVCG
FORTVCL	FORVCL
FORTVCLG	FORVCLG
FORTVG	FORVG
FORTVLG	FORVLG

Computing Center Summer Short Courses

The Computing Center is offering the following short courses this summer. Please pre-register to attend. Only 20 people will be admitted per section. Courses marked with an * require knowledge of the MUSIC Context Editor. THE COMPUTING CENTER RESERVES THE RIGHT TO CANCEL COURSES WITH LESS THAN 5 PEOPLE SIGNED UP.

1. Six separate 2-hour introductory sessions on the MUSIC/SP interactive operating system, using the 3270 Protocol Converter to do FULL-SCREEN EDITING ON MUSIC/SP. To be held in Room 110 of the Science Library (ISB).

Monday, June 16	: 1-3 p.m.	Instructor: Telka Clem
Tuesday, June 17	: 6-8 p.m.	Instructor: Tim King
Saturday, June 21	: 9-11 a.m.	Instructor: Janice Green
Saturday, July 19	: 9-11 a.m.	Instructor: Janice Green
Wednesday, July 23	: 6-8 p.m.	Instructor: Telka Clem
Thursday, July 24	: 1-3 p.m.	Instructor: Tim King
2. Two separate two-hour sessions on System Files in SAS and SPSS-X. To be held in the Graphics Lab (ISB):

Wednesday, June 18	: 3-5 p.m.	Instructor: Scott Barber
Monday, July 21	: 9-11 a.m.	Instructor: Scott Barber
3. Two separate three-hour sessions on VAX Utilities & Commands. To be held in Room 110 of the Science Library (ISB).

Tuesday, June 17	: 9 a.m. - Noon	Instructor: Ron Brashear
Monday, July 21	: 6-8 p.m.	Instructor: Ron Brashear

4. Two separate two-hour introductory session on SAS.* To be held in Room 110 of the Science Library (ISB).
 Wednesday, June 18 : 2-4 p.m. Instructor: Panu Sittiwong
 Monday, July 21 : 1-3 p.m. Instructor: Tim King
5. Two separate two-hour sessions on using MUSIC/SP Utilities.* To be held in Room 110 of the Science Library (ISB).
 Thursday, June 19 : 3-5 p.m. Instructor: Janice Green
 Friday, July 25 : 9-11 a.m. Instructor: Janice Green
6. Two separate two-hour introductory session on SPSS-X.* To be held in Room 110 of the Science Library (ISB).
 Tuesday, June 17 : 1-3 p.m. Instructor: Tim King
 Wednesday, July 23 : 8-10 a.m. Instructor: Panu Sittiwong
7. A two-hour introductory session on IBM JCL.* To be held in the Graphics Lab (ISB).
 Thursday, June 19 : 3-5 p.m. Instructor: George Morrow
8. An introductory on using SAS/GRAPH. To be held in the Graphics Lab (ISB).
 Wednesday, July 23 : 1-3 p.m. Instructor: Mansur Hasib

A Performance Comparison of Statistical Packages on Large and Small Computers¹

By Bob Brookshire, Manager of Academic Computing (AS03 @ NTSMUSIC)

Adapted from a paper presented at the annual meeting of the Southwest Political Science Association, San Antonio, Texas, March 22-24, 1986

Many researchers have access to a wide variety of computers and statistical software, especially as microcomputers are more widely deployed in faculty offices and research institutions. Some researchers could potentially use either a large mainframe computer, a mini- or superminicomputer, or one or more microcomputers for statistical analysis, and have a choice on each of these machines of several statistical packages. Making a selection among these environments is an important decision, since their relative costs and performance can vary widely. This paper assesses the performance of seven different statistical packages running on four different computers under five different operating systems. The results lead to clear recommendations as to which machines are suited for the most common types of statistical analysis, and which statistical package is best in each computer environment.

The statistical packages examined for this study include the most popular packages used on large computers for teaching and research, SAS (release 5.08), SPSS* (release 2.1), BMDP (April, 1985 version), and Minitab (release 81.1 and 82.1), and four packages widely advertised for use on microcomputers, SPSS/PC+, Statgraphics, Systat (version 2), and Stata. Four computers were used to perform the tests. A National Advanced Systems NAS/8043 mainframe, with 16 megabytes of memory, rated at about five million instructions per second (MIPS), provided the environment for the tests of SAS, SPSS*, BMDP and Minitab. This computer is approximately equivalent to an IBM 3083/K in processing speed.

The NAS/8043 runs the two most popular IBM operating systems, VM/CMS (release 3.03) and OS/MVS (release 3.1). This allowed the test of SAS, SPSS* and BMDP in the OS/MVS batch environment, as well as SAS under VM/CMS. The MUSIC/SP operating system (release 1.0), a fairly recent addition to the IBM family, provided the environment for the test of Minitab. A Digital Equipment Corporation VAX 11/785 was used to test BMDP and Minitab as well. This computer has 16 megabytes of memory, and is about 50 per cent faster than the widely used VAX 11/780, executing about 1.5 MIPS. The VAX runs under the VMS operating system, version 4.2. Terminal communications with the VAX and MUSIC/SP operating systems were at 9600 baud using a microcomputer to emulate a DEC VT-100 terminal. Communications with VM/CMS were handled through an IBM 3270-type terminal attached to a remote 3274 cluster controller.

The microcomputer packages were tested on two machines, a Tandy 1200HD and a Zenith Z-200. The Tandy computer uses the Intel 8088 microprocessor, and performs at about the same speed as the popular IBM PC.² The Zenith computer uses the Intel 80286 microprocessor running at 8 megahertz, and thus is somewhat faster than the IBM PC AT Model 99. The 8088-based Tandy contained 640K of memory, while the 80286-based Zenith had 512K. The two microcomputers operated under MS-DOS 2.12, and were not equipped with numeric coprocessors.

Test Procedures

To provide common data for all the tests, three data sets were used. A small data set containing 50 observations and 11 variables was generated using the Pascal programming language. The data set contained the observation number and alternating floating point and integer variables. The integer values were chosen at random from the range 0 to 999, while the floating point values were chosen at random from the range 0.000 to 999.999. A large data set containing 1,000 observations and 21 variables was constructed using the same procedure.

The third data set is an ill-conditioned set constructed by Wampler to test the accuracy of the least squares algorithms used in regression analysis.³ The data set contains four variables and four observations, and is characterized by extreme multicollinearity between two of the variables.

To assess the speed with which the statistical packages executed, six tasks were attempted with each of the packages in each of their environments. These tasks were chosen to represent the range of analyses performed by researchers, from simple data management to complex multivariate statistics using many variables. These tasks used the small and large random number data sets, which represent the size of many working data sets used in social research.

The tasks were: 1) to read and save the small data set in the file format suitable to the statistical package; 2) to read and save the large data set; 3) to perform a regression analysis using the small data set, with the first floating point variable as the dependent variable, and the next five variables (three integer and two floating point) as the independent variables; 4) to perform the same analysis using the large data set; 5) to perform a principal components factor analysis with varimax rotation using the 10 random variables in the small data set; 6) to perform a similar factor analysis using the 20 random variables in the large data set. Each of these analyses were executed using no special options or commands beyond the minimum required to complete the task.⁴

Because of the manner in which the statistical packages execute in the operating environments, different timing procedures were required for each environment. For the OS/MVS batch system, elapsed time for each task was calculated as the difference between the time the program was read into the system, as shown by the JES2 log, and the time the task finished printing, as indicated by the time stamp on the printout trailer.

For the MUSIC/SP, VAX/VMS, and microcomputer operating systems, execution time was measured using a stopwatch. Start time was taken as the moment the return key was pressed following the last command needed to execute the task, and finish time was indicated by the appearance of the last line of output for the statistical procedure on the microcomputer screen. For SAS under VM/CMS, start time was measured as the moment the SUBMIT function key was pressed, and finish time as the appearance of the first page of output on the terminal screen.⁵

All speed tests were conducted under "ideal" conditions. The large computers were used during periods in which there were few other users, and no time was spent in execution or print queues. The results of the analyses on microcomputers were directed to the display screen rather than to the printer. All data communications were handled at the top speed of the communicating devices. The results, with some exceptions noted below, represent the minimum times necessary to complete the test tasks, and are not those researchers should expect for real analyses.

Finally, as one indication of the numerical accuracy of the statistical package algorithms, each package was required to analyze the Wampler data set in each environment. Additionally, the SAS algorithms were evaluated using three different regression procedures. The microcomputer statistical packages performed the Wampler test only on the Tandy 1200HD, since the same copies of the programs were used in both microcomputer environments. It was necessary to decrease the tolerance limits for each of the regression routines in the packages so that the analysis could complete. Because there is no command to decrease tolerance in Minitab, the package was unable to perform the analysis.

Results

Table 1 presents the results of the speed tests for the six tasks. In the OS/MVS batch environment, SAS is generally the fastest package, followed closely by SPSS⁺. BMDP seems to run considerably slower than the other two packages, but this difference is somewhat deceptive. BMDP generally presents more lines of output than the other two packages; thus, most of the difference is due to printing time, not execution of the statistical procedure. An extreme example is task 6, where BMDP generated 39 pages of printout to 7 for SPSS⁺ and 3 for SAS.⁶ Execution times as measured by JES2 start and stop times were similar for the three packages.

Table 1
Time Required to Complete Standard Procedures
minutes:seconds
(see text for task descriptions)

A. Mainframe Environment (NAS/8043)

Package	O.S.	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
SPSS ⁺	OS/MVS	0:40	0:55	0:43	0:54	0:51	0:57
BMDP	OS/MVS	1:07	1:26	1:15	1:07	1:12	6:15
SAS	OS/MVS	0:27	1:03	0:15	0:36	0:35	0:44
SAS	VM/CMS	0:02	0:06	0:03	0:04	0:03	0:06
MINITAB 81.1	MUSIC	0:03	a	0:03	a	b	b

B. Minicomputer Environment (VAX 11/785)

Package	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
BMDP	0:13	0:33	0:14	0:22	1:11	5:17
MINITAB 82.1	0:02		0:03		b	b

C. Microcomputer Environments

Package	CPU	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
SPSS/PC +	8088	0:27	10:51	0:28	2:40	2:50	28:25
	80286	0:07	2:39	0:08	0:41	0:41	6:42
STAT- GRAPHICS	8088	0:53	23:02	1:30	15:29	8:11	a
	80286	0:14	6:58	0:24	a	2:15	a
SYSTAT	8088	0:57	34:35	0:26	6:15	4:02	37:43
	80286	0:06	8:45	0:08	1:34	0:57	10:18
STATA	8088	0:09	c	0:17	c	b	b
	80286	0:03	c	0:04	c	b	b

Notes:

- a. Insufficient memory available to complete task.
- b. Statistical procedure not available in this package.
- c. Review copy of program could not analyze large data sets.

The statistical packages which execute under interactive operating systems on the mainframe computer present most impressive results. Indeed, these analyses could almost be described as instantaneous. There are some limitations that should be noted, however. First, Minitab, although quite fast, is distinctly limited in the range of procedures available and the size of the data matrices it can handle, at least in the version available under MUSIC/SP. Second, although SAS under VM/CMS is amazingly fast, it requires a significant amount of machine resources. Task 6, for example, could not be executed with two megabytes of memory allocated to the virtual machine. Performance should slow considerably if several analysts use SAS simultaneously for large problems, since they will compete for memory and other resources.

In the minicomputer environment, Minitab's results are similar to those achieved on the mainframe, while BMDP is somewhat faster. Once again, some of this difference is due to the time it takes to print BMDP's verbose output. In the interactive minicomputer environment, BMDP begins generating results almost immediately. For each stage of an analysis, results are displayed as soon as they are finished. This contrasts with the OS/MVS batch system, where printing does not begin until the entire task has been finished, and the output does not become available until printing has stopped. Since output begins immediately, BMDP on the VAX will seem faster than the OS/MVS version even though, as in task 5, the packages actually finish in the same time.

The speed results for microcomputers illustrate the limitations of these machines for statistical analysis. For the small data set, microcomputers perform comparably with the larger computers, especially the Zenith 80286 machine. On the large data set, the microcomputers bog down considerably. The results for the Tandy 8088 machine are particularly slow when compared with all the other machines. Five years ago, taking half an hour for an analysis was acceptable. Given the kinds of performance achievable today, illustrated in Table 1, this is no longer acceptable.

Performance on the 8088 machine could be considerably enhanced by the addition of the 8087 numeric coprocessor. Increases of up to seven times in execution speed have been observed with the 8087 compared with the 8088 alone. This would make the 8088 machine even faster than the 80286 microcomputer for numeric tasks. Likewise, there is an 80287 coprocessor available for 80286 machines. Although the performance gains associated with this coprocessor are not as dramatic as with the 8087, the 80287 should noticeably improve the speed of the 80286 as well.⁷

This is not to indicate that the 80286 machine performs poorly. In fact, this machine seems to execute these tasks about as quickly as they are performed on the mainframe in the OS/MVS system, and sometimes even faster depending on the statistical package being used. The 80286 computer seems to be a reasonable match for all but the interactive packages in the mainframe environment. Only on task 6, the most complex, does the performance of the IBM PC AT class machine begin to degrade significantly.

The software tested on the microcomputers showed noticeable variation in performance. One package, Statgraphics, was clearly not up to the tasks presented to it. Not only was the package extraordinarily slow even among microcomputer programs, but it was unable to execute several of the tasks entirely. It required inordinate amounts of memory, even going so far as to demand more than the 640K on the 8088 machine, which is the maximum that can be addressed by the MS-DOS 2.12 operating system. The most impressive performer of the packages, Stata, does not contain a wide variety of statistical procedures, although its capabilities for graphical data analysis, unexamined in this paper, are impressive. Assessment of its merits was likewise hampered by the inability of the review copy of the software to analyze large data sets. SPSS/PC+ and Systat clearly performed quite well on all but the largest analyses.

The results of the Wampler test of the regression algorithm are presented in Table 2. The ideal values for the analysis are $B_0 = B_1 = B_2 = 100,000$, with the sum of squared residuals (SSR) equal to 40 billion. It is interesting that BMDP presented both the worst and the best results on this test. BMDP under the OS/MVS operating system calculated values for the regression slopes that were way off the mark, and did the poorest on the SSR value as well. BMDP under the VAX/VMS system, however, got the results exactly right, the only package to do so. Representatives of BMDP were unable to account for this anomaly.

Table 2
Results of Wampler's Test Problem^a
(rounded to two decimal places)

Package	B_0	B_1	B_2	SSR
True Values	100,000.00	100,000.00	100,000.00	40,000,000,000.00
SAS REG ^b	100,000.00	99,999.99	100,000.01	40,000,000,000.00
SAS GLM	100,000.00	99,999.99	100,000.01	40,000,000,000.00
SAS MATRIX	100,000.00	100,000.00	99,999.80	40,000,000,000.00
SPSS ^a	100,000.00	100,000.01	99,999.99	40,000,000,000.00
BMDP OS/MVS	100,000.00	60,975,232	-60,775,232	39,994,194,484.56
BMDP VAX	100,000.00	100,000.00	100,000.00	40,000,000,000.00
SPSS/PC+	100,000.00	100,000.04	99,999.96	40,000,000,000.00
SYSTAT	100,000.00	100,000.02	99,999.98	40,000,000,000.00
STATA	100,000.00	99,999.86	99,999.89	40,001,000,000.00
STAT- GRAPHICS	100,000.00	100,000.00	99,999.95	40,000,000,000.00

Notes:

- a. MINITAB did not complete the analysis.
- b. SAS presented identical results under VM/CMS and OS/MVS.

The SAS statistical package contains several ways to generate regression results. The REG procedure is the standard for regression, but GLM, a generalized linear models program, is still widely used. SAS also contains a matrix manipulation route, MATRIX, that will perform the necessary matrix calculations. GLM and REG presented essentially identical results (to the fourth decimal place), while the MATRIX procedure was slightly different. These differences are well within the bounds reported for most statistical software, however.

In fact, the most noticeable feature of Table 2 should not be the differences between the packages, but the degree to which they agree. This general agreement of results indicates that the statistical programmers who wrote these packages have employed stable algorithms which generate good results even under the most trying conditions. This is not too surprising for the older packages, such as SAS and BMDP, but it is reassuring to see that the newer microcomputer packages come up with similar numbers. We can have some confidence in the results of analyses conducted with these programs.⁵

Discussion

Which package, and which environment, should a researcher choose for data analysis? The answer clearly depends on the size of the analysis. For small data sets, all of the packages in all of the environments perform about the same. The choice among them should be based primarily on what the analyst will be charged, if anything, for the use of the machine. These charges should then be weighed against less tangible factors such as ease of use of the operating system and statistical software. Some analysts will find microcomputers more congenial in this regard, while others may choose a familiar mainframe package.

For larger analyses, however, the choice is clear. Even with the larger microcomputers, performance begins to degrade significantly with analyses using 1,000 cases and 20 variables. Analyses of this size or larger should probably be started on a mainframe or superminicomputer, where data manipulation and subsetting chores can be performed quickly. If complex multivariate procedures are needed, these analyses should likewise be contained on large computers. It could certainly make sense, however, to transfer portions of large data sets to microcomputers for less sophisticated analyses, if that were compatible with the research plan.

In the VM/CMS environment, one could hardly do better than SAS for a statistical package, except where the machine is heavily loaded. In the OS/MVS batch system, both SAS and SPSS are good performers. In the VAX world, BMDP is quite acceptable; Minitab, however, should probably not be considered for research, although it can be a useful teaching tool.

Microcomputer users who do not have numeric coprocessors should probably think twice before attempting any sizeable research project on these small machines. Given that limitation, however, SPSS/PC+ and Systat are both excellent packages, with SPSS/PC+ being a slightly better performer. Stata is extremely handy for some kinds of analysis, but is too limited to be called a general statistical package. Statgraphics, like Minitab, would not prove suitable for many researchers.

Notes

¹Some of the results reported here were previously presented at the 1985 meeting of Official Representatives of the Inter-University Consortium for Political and Social Research, Ann Arbor, Michigan.

²Jon R. Edwards and Glenn Hartwig, "Benchmarking the Clones," *BYTE* Vol. 10, no. 11 (Fall, 1985): 195-201.

³R. Wampler, "Test Problems and Test Procedures for Least Squares Algorithms." *National Bureau of Standards* (1978). The data set is as follows:

Y	X ₀	X ₁	X ₂
200,000	1	1.00001	0.99999
600,000	1	2.00001	1.99999
400,000	1	1.99999	2.00001
400,000	1	0.99999	1.00001

⁴The exceptions were SPSS* and SPSS/PC+, in which the algorithm for varimax rotation failed to converge in 25 iterations for the large data set. The convergence criterion was lowered to 0.001. There were no substantial differences between the completion times of the analyses which failed to converge and the analyses in which the convergence criterion was lowered.

⁵All SAS calculations have completed at this point, and the speed of the output display is determined solely by how rapidly the FORWARD function key is depressed by the analyst.

⁶BMDP by default prints the factor scores for all cases in the analysis, as well as correlation matrices and plots of the factor scores. These results are optional with SAS and SPSS*.

⁷See Stephen R. Fried, "The 8087/80287 Performance Curve," *BYTE*, Vol. 10, no. 11 (Fall, 1985): 66-88.

⁸Compare the results reported in James W. Pease, *et al.*, "An Evaluation of Selected Microcomputer Statistical Programs," Working Paper No. 15, Department of Agricultural Economics, Michigan State University, 1984, where two of the five packages examined failed to produce values close to Wampler's.

Data Entry Gains Employee

Renate Roberts has joined the Data Entry staff as a full time operator. She was previously employed in the Registrar's office. A native of West Germany, Ms. Roberts has lived in Texas since 1975 and is a permanent resident of the United States. She has considerable data entry experience and we are pleased to have her on our staff.

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Denton Gets TIPC Bulletin Board

We received the following announcement the other day via MUSIC/SP MEMO:

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TI-Dent BBS 565-1884
Hours of Operation:
Monday - Thursday  8 p.m. - 7 a.m.
Friday             8 p.m. - 6 a.m.
Supports 300/1200 baud (2400 baud on order)
SYSOP: Charles Woods

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TI-Dent is dedicated to the Texas Instruments Personal Computer, but there are MANY public domain programs that any of our MS-DOS users may find helpful.

The Future of the TIPC?

Reprinted from *The Times* (May 1986), Newsletter of the Santa Clara Valley TIPC Users Group

On 5 May 1986 Richard Hargrove posted the following message on the TIForum of Compuserve. It is an official release by Texas Instruments Corporation to answer questions about the status of the TI Professional Computer.

Dallas - The TI Professional Computer utilizes the Intel 8088 chip technology which is considered in the current marketplace to be fully mature and still functionally competitive in performance to other PC products in this class. The current plans indicate minimum new engineering and development resources should be applied to such mature technologies.

Two of the key attributes of the current product are its ability to handle high resolution 720 x 300 bit mapped color graphics and broad base of third-party application software support. Currently in excess of 1,000 software titles are available for use on the TIPC. Plans are to continue to manufacture the TIPC to meet current and projected levels of demand.

The current customer base for the product is represented by two specific application areas:

1. A design-in application in which the customer has developed a specific solution tied to the unique capabilities of the TIPC.
2. Use of the product as a terminal attached to the TI Business Systems Series of minicomputers, with the alternate use as a stand-alone computing workstation.

Price is not considered the most critical criteria of the product, and it is anticipated that no additional competitive pricing action or moves would be required to sustain the current level of volume.

There is no current plan to curtail any production for the TIPC or make changes to any of the service and support areas. The current customer base represents a steady volume and current plans are to continue the production for this machine well through 1986 and into 1987 and beyond, if the demand exists.

DOS Warning

Reprinted from The Times (May 1986), Newsletter of the Santa Clara Valley TIPC Users Group. Credited originally to Geoff Haddon in the LOTUS Newsletter, Feb. 1986.

Assume you are in DOS, with the DOS prompt visible on your screen, and you attempt to copy a file from disk X to drive A to Disk Y in drive B. And assume that you mistakenly place an important program disk in drive B when you enter **COPY A:FILE.EXT B:**. But you're lucky — you left the write-protect tab on disk Y, so DOS gives you the error message:

Write protect error writing B:
Abort, Retry, Ignore?

What should you do? If you're like most people, you'd just take out the valuable disk from drive B, substitute another data disk, and press either **R** for "Retry," or **I** for "Ignore." But if you did this, you'd be in trouble.

It turns out that one of the first things DOS does when you issue the COPY command is to read and store the filename directory of the target disk. In fact, DOS does this even before checking to see if the target disk is write-protected. Thus, if you remove the write-protected disk, insert the second data disk, and select either "Retry" or "Ignore," the COPY command continues where it left off. The directory from the removed disk is then placed on the newly inserted disk, which then makes all the files previously on the inserted disk inaccessible (unless you use the DOS "RECOVER" command or something like the Norton Utilities).

The solution is to **ABORT** in such situations, then change disks and try again.

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*                                     *
*           O P E R A T I O N S       *
*                                     *
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Disk Backup Schedules

Backup Schedule for OS/MVS

OS/MVS disk packs (academic and administrative) are backed up daily, Tuesday through Saturday, from 4-6:30 a.m., and Sunday from Midnight to 3 a.m. A backup of all the operating systems on the NAS machines and their contents is done once every two weeks at some low activity period over a weekend.

MUSIC/SP Backup Hours

A message will be sent to all users signed on to MUSIC/SP approximately 10 minutes before backups are begun. It will be in the form **** MUSIC SHUT DOWN AT xxxx AM - SCHEDULED BACKUP ****. To find out the backup hours while signed on to MUSIC/SP, enter **HELP HOURS**. The following backup schedule is currently in effect:

Tuesday	3 a.m. (for about 3 hours)	Weekly backup
Wednesday - Saturday	4 a.m. (for about 2 hours)	Daily backup
Saturday	Midnight (for about 2 hours)	Daily backup

PHOENIX Backup Schedule

PHOENIX is backed up weekly on Sunday night. The backup begins at midnight and lasts for approximately 30 minutes.

VAX Backup Schedule

Incremental backups of both VAX systems are performed Monday through Thursday at 4 p.m. Users do not have to log-off, but any files that are open at the time of the backup will NOT be backed up.

Full backups of both systems are done every Friday beginning at 8 a.m. These generally will take all day to complete. Again, users do not have to log-off, but any files that are open will not be backed up.

A "Stand Alone" backup of the system disk is done the third Tuesday of every month, in the afternoon, just before preventive maintenance. This procedure makes a copy of the system disk that can be used to restore its contents if the disk is completely destroyed. The system will be shut down; watch the system log-on message for specific times and dates.

NOTE: No backups are taken on the weekends. Requests for restoration of files should be made via MAIL to the username OPERATOR. Your file can only be restored if it existed before the last backup was done.

NAS/8043 and NAS/6650 Performance Statistics for April

CPU	SYSTEM	SCHEDULED OPERATING HOURS	PLANNED MAINT. HOURS	PLANNED PRODUCTION HOURS	UNPLANNED MAINT. HOURS	PRODUCTION HOURS ACHIEVED	SYSTEM UPTIME
8043	VM/SP3	720	0.05	719.95	5.68	714.17	99.2%
8043	MUSIC/SP	720	38.26	681.74	6.90	674.84	99.0%
8043	MVS/JES2	720	0.30	719.70	13.48	706.22	98.1%
8043	COMPLETEA	720	0.35	719.65	14.72	704.93	98.0%
6650	MVS/JES2	720	0.25	719.75	4.92	714.83	99.3%
6650	COMPLETEA	259	0.00	259.00	6.45	252.55	97.5%
6650	ADABASA	720	18.65	701.35	5.99	695.36	99.1%

System Uptime = (Production Hrs. Achieved)/(Planned Production Hrs.)

Production Hrs. Achieved = (Planned Production)-(Unplanned Maint.)

Scheduled Operating Hrs. = (Planned Maint.) + (Planned Production)

MUSIC/SP Planned Maintenance Hours include 21.83 Hrs. for system backup and 16.25 hours for VM/SP3 system backup.

ADABASA'S Planned Maintenance Hours include 18.65 Hrs. for system backup.

The NAS/8043 CPU achieved 100% uptime. The NAS/7360 DASD achieved 100% uptime. The NAS/7350 DASD achieved 99.9% uptime. The NAS/6650 CPU achieved 100% uptime. The STC 8650 DASD achieved 100% uptime.

Lost productivity is calculated as the greatest amount of elapsed time that any one of the production systems was unavailable for scheduled operation. Lost productivity hours were contributed to by the following key causes:

NAS/8043 CPU:

CPU, Tape, and Disk Subsystems (NAS)

1. 7350 DASD Failures/Fix 0.90 HOURS

Miscellaneous

1. Undetermined causes for system restarts 4.13
 2. An error in a user's Job Card caused the JES2 System to enter into program loops. 5.84
 3. Emergency power down due to air handler bearing failure in 5th floor of the GAB 2.42
 4. HALON Contractor caused the UPS auxiliary power system to trip out. 1.85
 5. Reset CPU Clock to Daylight Saving Time 0.35

TOTAL 14.59

GRAND TOTAL FOR NAS/8043 15.49 HOURS

BENCHMARKS**MAY, 1986**

NAS/6650 CPU:

Miscellaneous

1. Undetermined Causes for System Restarts	0.32 HOURS
2. Power failures in ISB caused BYMPX 0 to fail	1.18
3. Emergency power down due to air handler bearing failure in 5th floor of the GAB	2.42
4. HALON Contractor caused the UPS auxiliary power system to trip out	2.22
5. COMPLETA shut down to process single run production jobs	2.48
6. Reset CPU Clock to Daylight Saving Time	0.30
7. COMPLETA System Tuning/Improvements	0.08
8. COMPLETA System Failures	0.15

TOTAL 9.15 HOURS

GRAND TOTAL FOR NAS/6650 9.15 HOURS

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*****
*                                     *
*      TECHNICAL                     *
*      SUPPORT                       *
*                                     *
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NAS/8043 Program Hit Parade

The following programs were used the most frequently on the NAS/8043 during April.

APRIL TOP TEN PROGRAMS IN TERMS OF FREQUENCY OF RUNS

Program	Description	Number of Runs	Percent of Total
1. IEWL	Linkage Editor	21191	15.9
2. PGM=*.DD	Compiled Program	20109	15.1
3. IEBGENER	IBM Utility	17429	13.1
4. IKFCBL00	VS COBOL Compiler	16656	12.5
5. OTHER	Programs not Categorized	14177	10.6
6. SCRIPT	Waterloo/SCRIPT	10212	7.6
7. IEFBR14	IBM Null Utility	7295	5.5
8. SASLPA	SAS	7177	5.4
9. PTPCH	Dataset Lister	6362	4.7
10. IFOX00	System Assembler	4999	3.7

APRIL TOP TEN PROGRAMS IN TERMS OF CPU SECONDS USED

Program	Description	CPU Seconds	Percent of Total
1. SASLPA	SAS	55633	23.8
2. OTHER	Programs not Categorized	41485	17.8
3. PGM=*.DD	Compiled Program	37074	15.9
4. IKFCBL00	VS COBOL Compiler	30160	12.9
5. SCRIPT	Waterloo/SCRIPT	27347	11.7
6. IFOX00	System Assembler	11560	4.9
7. IEWL	Linkage Editor	9740	4.2
8. PTPCH	Dataset Lister	9147	3.9
9. IEBGENER	IBM Utility	3649	1.6
10. LOADER	System Loader	1560	0.7

Registration Form for Computing Center Short Courses

Please complete this form and return it AS SOON AS POSSIBLE if you wish to attend any of the short courses listed below. You may also register over the phone by calling 565-2324.

NAME: _____ PHONE: _____

DEPT: _____ CLASSIFICATION: _____

I wish to attend:

• Introduction to MUSIC/SP:

_____ Monday, June 16: 1-3 p.m. (ISB 110)
_____ Tuesday, June 17: 6-8 p.m. (ISB 110)
_____ Saturday, June 21: 9-11 a.m. (ISB 110)
_____ Saturday, July 19: 9-11 a.m. (ISB 110)
_____ Wednesday, July 23: 6-8 p.m. (ISB 110)
_____ Thursday, July 24: 1-3 p.m. (ISB 110)

• System Files in SAS & SPSS-X:

_____ Wednesday, June 18: 3-5 p.m. (Graphics Lab, ISB)
_____ Monday, July 21: 9-11 a.m. (Graphics Lab, ISB)

• VAX Utilities & Commands:

_____ Tuesday, June 17: 9 a.m.-Noon (ISB 110)
_____ Monday, July 21: 6-8 p.m. (ISB 110)

• Introduction to SAS:

_____ Wednesday, June 18: 2-4 p.m. (ISB 110)
_____ Monday, July 21: 1-3 p.m. (ISB 110)

• Using MUSIC/SP Utilities:

_____ Thursday, June 19: 3-5 p.m. (ISB 110)
_____ Friday, July 25: 9-11 a.m. (ISB 110)

• Introduction to SPSS-X:

_____ Tuesday, June 17: 1-3 p.m. (ISB 110)
_____ Wednesday, July 23: 8-10 a.m. (ISB 110)

• Introduction to IBM JCL:

_____ Thursday, June 19: 3-5 p.m. (Graphics Lab, ISB)

• Introduction to SAS/GRAPH:

_____ Wednesday, July 23: 1-3 p.m. (Graphics Lab, ISB)

PLEASE RETURN TO:

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The Computing Center
NT Box 13495
North Texas State University
Denton, TX 76203

Get a "Subscription" to Benchmarks

Benchmarks is a vital link between the NTSU Computing Center and the users of our facilities. It is important for all users of the computing facilities to maintain a file of these newsletters because they contain materials which will periodically update existing documents as well as information and suggestions on uses of OS/MVS, MUSIC/SP, the VAX Cluster, Microcomputers, and other resources available to NTSU students and faculty. To facilitate the dispersal of *Benchmarks*, *** **FREE** *** subscriptions are available. To receive yours, send the following information to us either by "snail mail" (the post office or campus mail) or electronically, through the MEMO facility on MUSIC/SP to AS04.

Name _____

Mailing Address _____

Name _____

Mailing Address _____

_____***PLEASE GIVE A CAMPUS ADDRESS (NOT BOX) IF POSSIBLE! - It's Cheaper!!***

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